



Summit for Recycling
&
Rocky Mountain Composting Symposium

Conversion of Food Waste to Sustainable Aviation Fuel via Volatile Fatty Acids (VFA-SAF)

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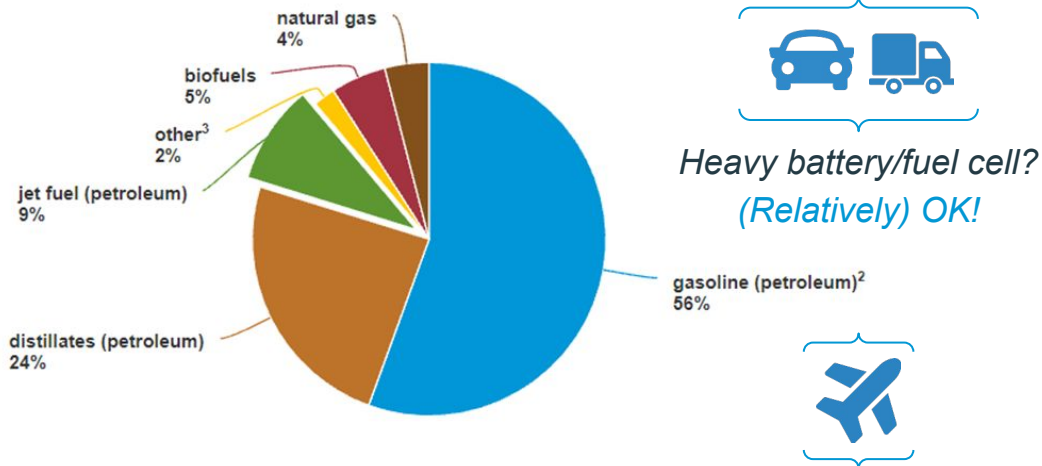
August 23 - 24, 2022 Aurora, Colorado



But why [aviation fuel]?
-D. Zoolander

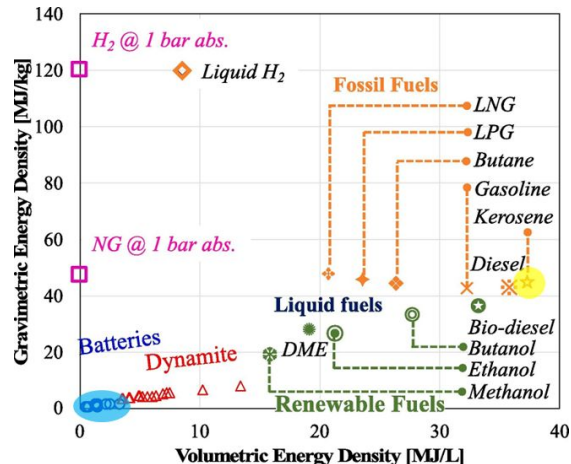


U.S. transportation energy sources/fuels (2020)



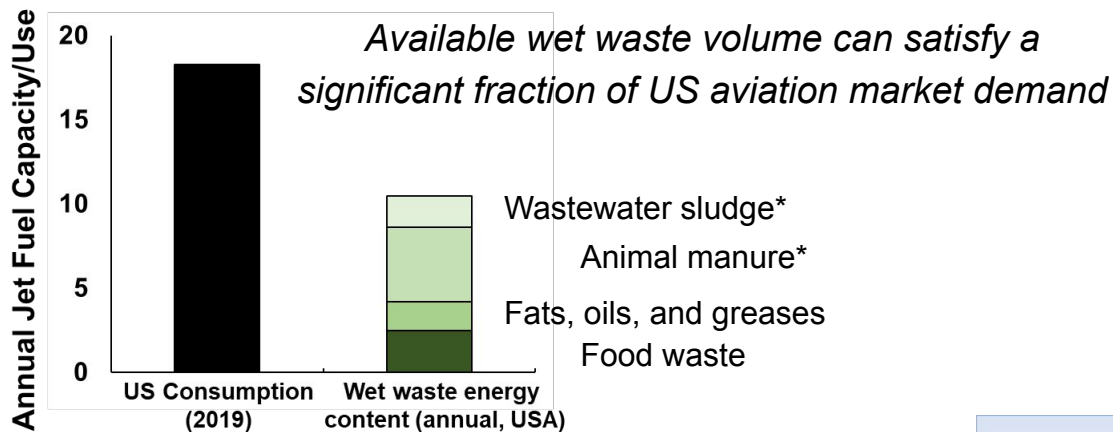
<https://www.eia.gov/energyexplained/use-of-energy/transportation.php>

Yu et al. *Applied Energy* (2020) 271, 115169. 10.1016/j.apenergy.2020.115169



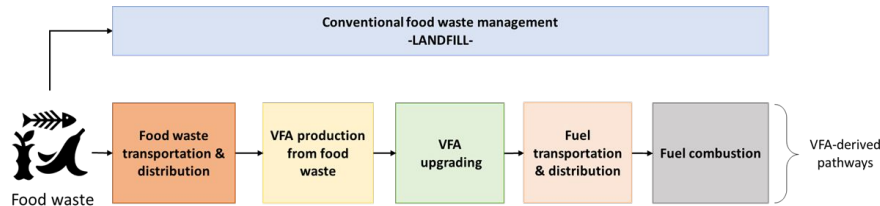
Weight constraints necessitate continued use of liquid aviation fuels

VFA-SAF: Two Birds with One Stone?



Skaggs et al. *Renewable and Sustainable Energy Reviews* (2018) 82, 2640-2651.
 U.S. Bureau of Transportation Statistics (2022).
 Miller et al. *Joule*. Under review.

Avoids CH₄ emissions-generating conventional wet waste disposal

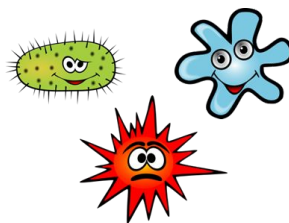


*More R&D needed to utilize these wastes

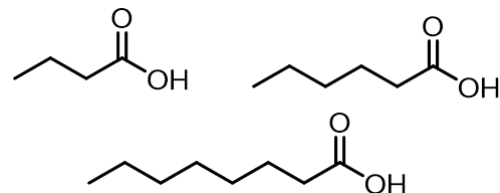
Food waste to VFAs to Ketones



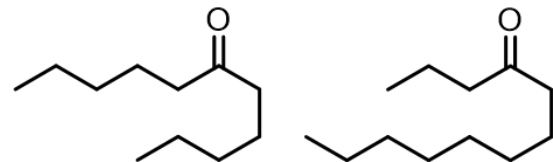
Food waste



Biological processing (arrested methanogenesis)



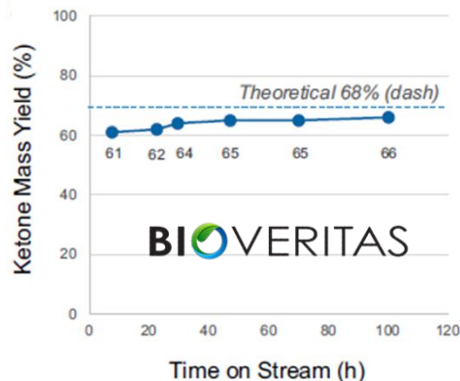
Volatile fatty acids (VFAs)



Ketones

Ketonization of food waste-derived VFAs (~100 mL/day)

Huq et al. *PNAS* (2021) 118 13 e2023008118

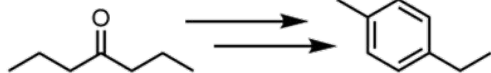


Conditions: T=350°C, Commercial ZrO₂ catalyst powder, P=82 kPa, Ar sweep gas, WHSV=6 hr⁻¹

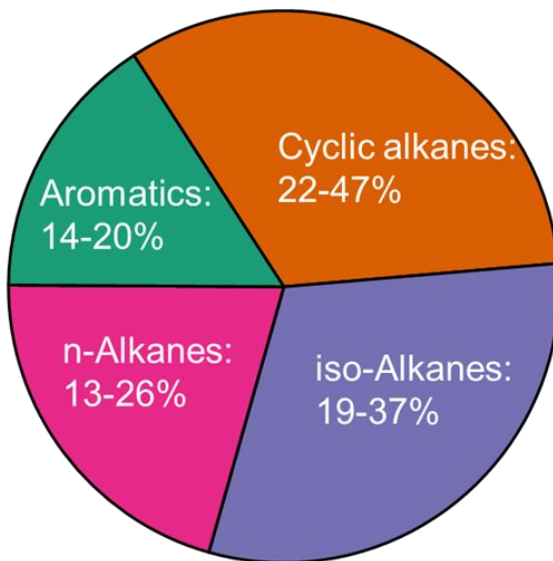
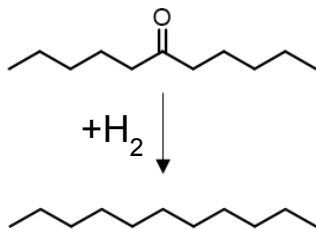
Ketones to SAF Molecules

Goal: Make SAFs with identical properties to petro-jet

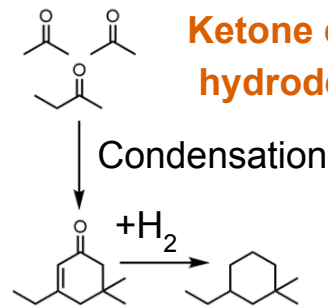
Ketone cyclization



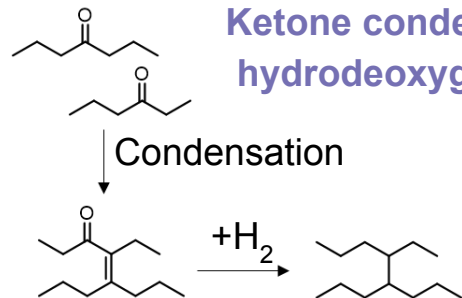
Ketone hydrodeoxygenation



Ketone condensation, hydrodeoxygenation



Ketone condensation, hydrodeoxygenation





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Goal: VFA-SAF at an airport near you by 2030



Commercialization partner:

ALDER FUELS



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